INTERSTELLAR EXTINCTION IN THE ULTRAVIOLET

An observational program to measure stellar energy distributions in the ultraviolet between 3000A and 1200A has recently been completed. The instrumentation used was similar to that reported by Stecher and Milligan (1962). A necessary preliminary for a discussion of this material is some knowledge of the extinction due to interstellar absorption. The trend of this extinction was first reported last year (Stecher, 1964). Additional observational material has since been obtained and is the subject of this letter.

Five pairs of stars with similar MK spectral classifications have been observed that are suitable for obtaining extinction. They are (ζ Per-ρ Leo), (ξ Per - ζ Pup), (σ Per - β Can Maj), (σ Sco - π Sco) and (δ Sco - τ Sco). The telemetry records were hand reduced by the author and each star was multiplied by the absolute calibration curve for the appropriate instrument. The resulting flux curve was placed on a magnitude scale. Since interstellar extinction is obtained from the magnitude difference between two stars, the calibration factors completely cancel when both stars were observed by the same instrument. When the pair members are observed by different instruments the consistency of the calibration from one instrument to another enters but not the absolute calibration. The instruments used for each reddening pair were calibrated at the same time. Comparison with stars observed by more than one instrument indicate this error is negligible.

The extinction curve for each star pair has been normalized to B-V = 1 using colors reported by Johnson and Borgman (1963) and by MacRae (1961). For various observational reasons the extinction curves are not

complete for any star pairs. I have therefore taken the mean values and the standard deviation for the available points at each wavelength to plot in Figure 1. A point by point computer reduction of all the star data is in progress and is expected to yield more pairs and greater accuracy for the existing pairs. This data will be reported star by star in detail when it is completed.

In Figure 1, I have plotted the mean extinction points and also plotted the mean extinction curve of Boggess and Borgman (1964) with V = 0 for reference. An additional point was obtained from Alexander et al., (1964) and two points from Chubb and Byram (1963). The separation between scatter that is intrinsic to extinction and observational scatter is difficult at this time but for some stars the peak at $\lambda^{-1} = 4.4$ appears to be considerably higher and drops off more rapidly before beginning to rise again. In view of recent results by Johnson (1965) and others this is probably an intrinsic variation. The following letter will suggest a possible explanation for this peak.

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REFERENCES

Alexander, J. D., Bowen, P. J., Gross, M. J. and Heddle, D. W. O. 1964, Proc. Roy. Soc., A279, 510.

Boggess, A., and Borgman, B. 1964, Ap. J., 140, 1638.

Chubb, T. A., and Byram, E. T. 1963, Ap. J., 138, 617.

Johnson, H. L. 1965, Ap. J. 141, 923.

Johnson, H. L. and Borgman, J. 1963, B.A.N., 17, 115.

MacRae, D. 1961, Observatory Handbook (R. A. S. of Canada) 70.

Stecher, T. P., 1964, A. J. 69, 558.

Stecher, T. P., and Milligan, J. E. 1962, Ap. J. 136, 1.

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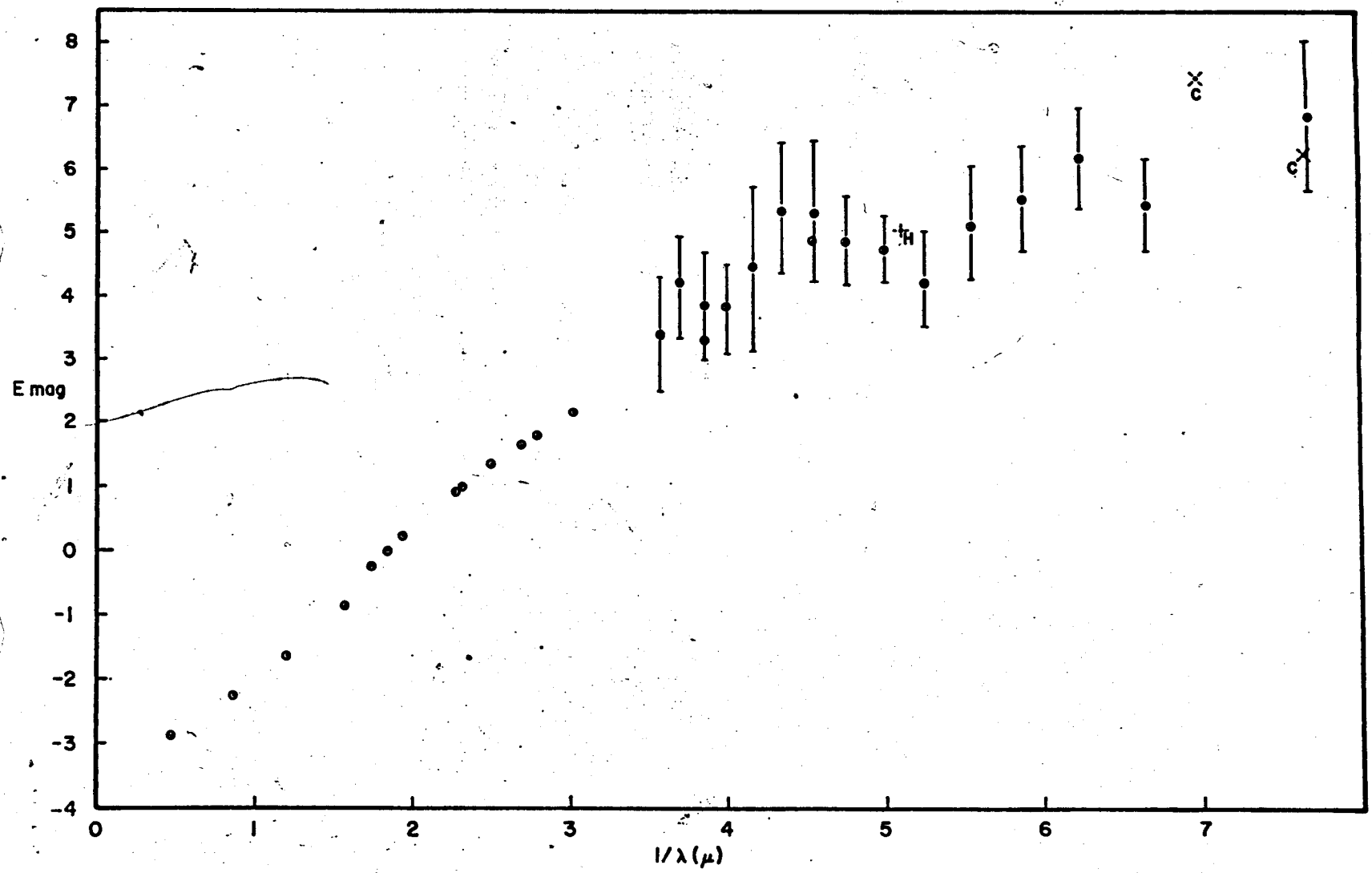
Fig. 1 - The observed mean value for interstellar extinction. Large solid dots - Mean values for interstellar extinction and its mean error for up to five pairs of stars as a function of inverse wavelength. Open circles - Boggess and Borgman (1964). The point marked H is from Alexander et al., (1964). The points marked C are from Chubb and Byram (1963). All values are normalized to B-V = 1 and V = 0.


E mag
1/λ (μ)
8
7
6
5
4
3
2
1
0
-1
-2
-3
-4
0
1
2
3
4
5
6
7
C
C
H
H